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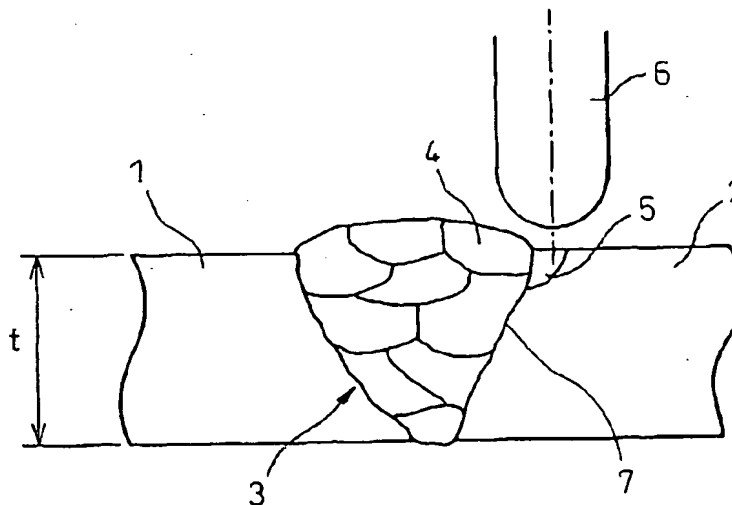
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- (51) 国際特許分類<sup>1</sup>: C21D 7/06, B23K 31/00 (72) 発明者: および  
(21) 国際出願番号: PCT/JP2003/013875 (75) 発明者/出願人 (米国についてのみ): 石川 忠  
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2002年10月30日 (30.10.2002) JP 郎 (NOSE, Tetsuro) [JP/JP]; 〒293-8511 千葉県 富津市  
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[JP/JP]; 〒100-8071 東京都 千代田区 大手町二丁目 (81) 指定国 (国内): AE, AG, AL, AM, AT, AU, AZ, BA, BB,  
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(54) Title: METHOD OF INCREASING TOUGHNESS OF HEAT-AFFECTED PART OF STEEL PRODUCT WELDED JOINT

(54) 発明の名称: 鋼材の溶接継手における熱影響部の靱性向上方法



(57) Abstract: A method of increasing the toughness of heat-affected part of multilayer welded joint, lap fillet welded joint or one or more pass high heat input welded joint with respect to steel products. In particular, a method of increasing the toughness of heat-affected part of steel product welded joint, characterized in that heating by means of ultrasonic vibration terminal or shot-peening by means of ultrasonic vibration steel balls is applied to the surface of heat-affected part formed by final pass of steel product multilayer welded joint, so that in a metal structure adjacent to fusion line (FL) of welded metal and host metal at the heat-affected part formed by final pass, the average of major diameters of crystals lying in the zone from steel product surface to depth of 2 mm or more becomes equal to the crystal grain diameter of host metal before welding at a depth of 1/4 of sheet thickness (t) from the steel product surface.

(57) 要約: 鋼材の多層溶接継手、隅肉溶接継手、1パスまたは数パスの大入熱溶接継手における熱影響部の靱性向上方法を提供するもので、鋼材の多層溶接継手の最終パスにより形成された熱影響部の表面に、

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HU, ID, IL, IN, IS, KE, KG, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR),  
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超音波振動端子による打撃処理または超音波振動鋼球によるショットピーニング処理を行うことにより、前記最終パスによって形成された熱影響部における溶接金属と母材とのフュージョンライン (FL) に隣接する金属組織において、前記鋼材表面から 2 mm 以上の深さまでの各結晶の長径の平均を、該鋼材表面から板厚  $t$  の 1/4 の深さにおける溶接前の母材の結晶粒径相当とすることを特徴とする鋼材の溶接継手における熱影響部の靱性向上方法。

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP03/13875

**A. CLASSIFICATION OF SUBJECT MATTER**  
Int.Cl.<sup>7</sup> C12D7/06, B23K31/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
Int.Cl.<sup>7</sup> C21D7/00-7/10, B23K9/235, 31/00, B24C1/10

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
Jitsuyo Shinan Koho 1922-1996 Toroku Jitsuyo Shinan Koho 1994-2004  
Kokai Jitsuyo Shinan Koho 1971-2004 Jitsuyo Shinan Toroku Koho 1996-2004

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 9-234585 A (Mitsubishi Heavy Industries, Ltd.), 09 September, 1997 (09.09.97), Claims (Family: none)	1-5
A	US 6171415 B (UIT, LLC), 09 January, 2001 (09.01.01), Claims; column 7, line 19 to column 8, line 18; Figs. 3 to 5 (Family: none)	1-5
A	JP 64-79320 A (Nippon Steel Corp.), 24 March, 1989 (24.03.89), Claims; page 2, lower left column, line 19 to lower right column, line 4 (Family: none)	1-5

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

"A" Special categories of cited documents: document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier document but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search  
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Name and mailing address of the ISA/  
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Authorized officer

Facsimile No.

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# INTERNATIONAL SEARCH REPORT

International application No.

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## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 53-22843 A (Nippon Steel Corp.), 02 March, 1978 (02.03.78), Claims; page 1, lower left column, lines 16 to 18 (Family: none)	1-5
P, A	JP 2003-113418 A (Nippon Steel Corp.), 18 April, 2003 (18.04.03), Claims (Family: none)	1-5

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